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ACTION

DIST.	LTR	ENC
BOGENBERGER, V.		
BOGNAR, E.		
DECK, C. A.	X	X
DEGENHART, K.		
DIETER, T. J.		
DIETERLE, S. E.		
FERRERA, D.W.	X	X
FERRI, M.S.		
GERMAIN, A. L.		
GIACOMINI, J.		
ISOM, J. H.		
MARTINEZ, L.A.	X	X
MCLAUGHLIN, J.		
NORTH, K.	X	X
PARKER, A.M.		
POWERS, K.		
RODGERS, A. D.		
SCOTT, G.K.		
SHELTON, D.C.	X	X
SPEARS, M.S.		
TRICE, K.D.		
TUOR, N.R.		
VOORHEIS, G.M.		
WILLIAMS, J. L.	X	X
BUTLER, L	X	X
NININGER, R	X	X
CABLE, J.	X	X
LANDRY, D.	X	X
DUNSTAN, S	X	X
Fielweg, R	X	X
KUKAVINA, F.	X	X
COR. CONTROL	X	X
ADMN. RECORD	X	X
PATS/130		

Reviewed for Addressee Corres Control RFP

7/2/02 Date — By bg

Ref Ltr #

DOE ORDER # 5400.1

STATE OF COLORADO

Bill Owens, Governor
Jane E. Norton, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department of Public Health and Environment

June 28, 2002

Mr. Joseph A Legare
Assistant Manager for Environment and Infrastructure
U.S Department of Energy, Rocky Flats Field Office
10808 Highway 93, Unit A
Golden, CO 80403-8200

RE: Site Wide Water Balance Modeling Report Comments

Dear Mr. Legare

In general we are pleased with the results presented in this report We thank DOE and Kaiser Hill for undertaking the project We commend Chris Dayton, Bob Prucha, and Chris Holly for the monumental task they have accomplished

We have done the best we could to review this lengthy and complex report in the time requested. The comments attached represent questions and suggestions that we hope will be the beginning of a more collaborative period of using the tool the site has developed. We have some reservations about using the model as is for decisions about surface water end state. Any further information for ground water questions will likely involve additional modeling.

We look forward to working with the site to identify and develop additional work with this valuable tool If you have any questions regarding our comments please contact Elizabeth Pottorff at 303-692-3429 or Karen Holliway at 303-692- 3377.

Sincerely,

Steven H Gunderson
RFCA Project Coordinator

cc Norma Castaneda, DOE
Tim Rehder, EPA
Lane Butler, KH
Dave Shelton, KH
Administrative Records Building T130G
Jerry Henderson, RFCAB
Melissa Anderson, RFCLOG
Shirley Garcia, Westminster
Kathy Schnoor, Broomfield

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ADMIN RECORD

SW-A-004531

1/7

CDPHE Comments on the Site Wide Water Balance Model Report, May 2002

Elizabeth Pottorff Comments

General: We commend Chris and the modeling team on the tremendous effort represented in this document. We appreciate the attention to detail in developing the site conceptual model and the level of detail that has gone into assessing and organizing the various data. We hope that the future uses of this model will be more collaborative and we would anticipate working with the site to improve the model calibration and the predictive scenarios. We do have concerns with certain areas of the model that are elaborated in our specific comments However, too much work has been done to create this tool to declare it final and attempt to use only the current conclusions as they are presented for the decisions that need to be made.

Specific.
Section 5.2 3 3.1, Page 5-18: Distribution and method of adjustment of saturated hydraulic conductivities appears reasonable Adjusting entire geologic units rather than individual cells is helpful to the overall understanding of the gross scale groundwater flow The Rocky Flats Alluvium does have zones with differing alluvial architecture that likely to have some variation in hydraulic conductivity. There are several areas in the buffer zone that have over prediction of head (north of the T130 complex, and the east mesa) where hydraulic conductivity might reasonably be adjusted to improve the calibration.

Section 6 1 3.3 We think ground water recharge in the western model area is important to the overall understanding of the future water balance The model should be run with a long enough climate history to stabilize all areas of the model.

Section 6.1.3 4· Some areas of over-prediction of the ground water levels could be correlated with areas of the site where faulting has been inferred Not accounting for the associated fracture zones could account for the higher than observed water levels.

Section 7 1 3· Hillslope and mesa ground water levels should be stable for the model to be considered calibrated. The model should be run with a long enough climate history to stabilize all areas of the model.

Section 8.1 8. When the calibration year model was not sufficient to stabilize changes to the ground water flow system we do not believe the land configuration scenario was run with sufficient climate data to allow stabilization and therefore may not be an adequate prediction of the future water balance

Section 8.2 3: It is essential to allow the water levels in the industrial area to adjust to the increased recharge in the Site Configuration Scenario.

Section 8 2 4: Increased resolution models for the Solar Ponds and Present Landfill interception systems would be very helpful for decisions being made in these areas

2

Page B-57, Solar Pond Remediation System Does this conceptualization reflect the current operation of the treatment system?

Section B 2 2 2 2 9, Page B-61 Does the vertical hydraulic conductivity distribution allow water to be discharged from the bottom of the model?

Page B-85 Are ponds modeled with a low leakance or none?

Section B3 2 2 1, Page B-90 It appears to take longer than a year for some wells to return to average levels after the 1995 recharge event

Figure D-13 Leakance is in what units? The legend says 1/s??

Section D 4, Page D-22 The column models showing ET accounts for most of the ground water response in continuously monitored wells is difficult to understand without any documentation.

Figure E-8 Actual seeps appear to be faintly outlined on this map but are not identified in the legend A significant number of small seeps along the edges of the industrial area do not show up in the simulation Nor does the major seep complex on the south side of S Walnut Creek Why were adjustments to model parameters similar to those used in the Antelope Springs area not used in this area of the model

Figure E-11 Baseflow appears significantly over predicted in all these graphs. The flumes at GS10 and SW093 are being replaced and may not have produced accurate observed data. Please discuss the significance of the baseflow to the overall surface water calibration and the possible reasons for it

Figure E-21 What other measures were used to assess the average error in the head calibration? Are plots of mean error or root mean squared error available?

Section E 2 3 2 2 The assessment of ground water impacts from the spring of 1995 in the simulation is incomplete and should not be considered validation of the model for wet year impacts

Karen Holliway Comments

Section 3 2, page 3-15, last paragraph. Discussion of groundwater below the bottom of the streambed during pond retention periods and pond discharge estimate of one-third lost to groundwater Provide reference of where data is to support this statement

Page 3-8 Provide description of where and how (via what type of engineered drainage control e.g , storm drains, sanitary system) footing drain water is routed to surface streams Does all footing drain water lead to streams or is it diverted elsewhere?

Page 3-9 The use of the term 'diverted' to describe groundwater flow upstream of the IA seems to imply an engineered structure. Suggest revision to say – Groundwater upstream of the IA flows toward the upper drainages of Walnut Creek and Woman Creek.

Figure B-19 does not depict backfill trench effects as stated on page B-45, 1st paragraph.

Figure B-21 Is the Central Avenue Ditch not considered a storm sewer? Based on presentation in the figure one would assume that only storm sewers constructed of impervious surfaces are considered Provide clarification on how are the unlined e.g., pervious surface storm water control drainages considered within the model.

Clarification should be provided how the evaluation of Central Avenue Ditch considered in the model calibration, to understand how this critical path of storm flows is evaluated in the model.

Was the 881 Hillside French Drain system included in the model?

Figure 6-4. Figure depicts model results for surface flow volumes compared to observed data Do we understand the contributing factors resulting in the significant differences in the model response between the Woman Creek (less conservative simulation) and Walnut Creek (more conservative simulation)?

Figure 7-4 Scenario for Calibrated Model Dry Climate - Seems like the net model fluxes for subsurface boundary inflow and outflow and surface water inflow and outflow are high relative to precipitation and storage (not much change reflected from the wet year model fluxes)

Scenario for No Imported Water Wet Climate – Seems like the surface water inflow and outflow are low relative to the projected storage change. In turn would the storage change increase as much as projected given the point of saturation where outflow needs to occur to equilibrate the interaction of groundwater to surface water.

Figure 7-6 Reflection of baseflow calibration year to land configuration scenario Provide explanation why McKay and Upper Church Ditch and upper drainage of Woman Creek and Antelope Spring would be impacted by the land configuration of the IA.

Figure 7-7, Walnut Creek scenario. Relative to the Woman Creek drainage which receives surface inflow from upstream sources, why would the future Walnut Creek drainage, which does not receive surface inflow from upstream sources, exhibit a greater flow regime Especially given the assumed increase in pervious surface area as a result of land reconfiguration, where precipitation would more readily infiltrate in the subsurface consisting of presumed Qrf materials The drainages are similar geologic regimes with Qrf on the mesa (hill tops), Qls on the slopes and Qc or Qp at the base of the drainages

Figure 7-17, In-Situ Water Collection Need to add explanation of the large relative difference in discharge volume for the East Trench Area, given that previous information indicated that the landfill area received more intense precipitation events

Section 7 2 3 2 Provide explanation on how the annual average of B4 and B5 remains unchanged when these ponds receive daily transfer of water from B3

Section 7.4, Summary Where is the data/information for the 10-year simulations for the Land Configuration Scenario and the WY2000 scenario.

Figure E-1 For the climate category, only snowmelt is identified What about other precipitation events and temperature and humidity (for evaporation considerations)

Figure E-8 The seep area to the south of South Walnut Creek is not reflected as a saturated zone discharge This seems inconsistent with the other seep area impacts from saturated zone discharge

Figure E-11 The wide variance in response of the simulated and observed baseflows needs explanation or identification of qualifiers

Figure E-19. For the WY2001 volumes relative to other events, why is GS03 simulated greater than observed (other events were opposite). An explanation of qualifier needs to be incorporated

Figures E-26 to E-29 The corresponding discussion and these figures are not consistent in use of terminology and use of points of reference This leads to difficult end-user understanding of these critical concepts to model performance

Figure E-27 The variability is response of various physical aspects of the hydrogeologic regime relative to the near stream at GS03 and GS01 requires some explanation to understand the reliability of the model calibration

Figure E-28 Provide explanation as to why the variable response in water balance for the remediation systems exists for the Solar Ponds, East Trench and 881 Hillside remediation systems

Reader Understanding

Page 1-6. Use of terms river versus stream Provide clarification that the model uses reference to rivers, which applies to the streams crossing Rocky Flats

Page 3-2 Of the hydrologic stresses what would be considered surface inflows

5

Page 3-10. Are the terms channels and drainages the same.

Section B.3.1 2 1 and Figure B-22. Suggest overlay sub basin drainages on footing drain map to support the drainage basin discussion in B.3.1.2.1 and add a reference to the text

Section B.3.1.2. Add a description of what features are incorporated in channel flow as it is discussed in this section.

Tables B-4 and B-5. Are notes in Table B-5 associated with Table B-4 as well. If not suggest notes need to be added as appropriate.

Page B-75. Statement "Volume measured at the discharge point for ponds is 90% of that observed at GS-03." Should this statement be reversed?

Figure B-23. To be consistent with presentation in other figures evaluate color coding and use of terms active, new, inactive, old Are these terms interchangeable relating to the sanitary system and process waste lines

Figure B-27. Please include conceptual of trench system, which applies to the Solar Pond, Mound, and East Trenches Remediation systems.

Figure B-34 and B-35. There is an inconsistent reflection of GS03 Daily Mean Discharge past June, note should be added to the Figure to explain. Other notes should be added where pond discharges impact hydrographs

Figures B-38 to B-40. Suggestion addition of notes of those loss/gains associated with pond management.

Figures B-38 to B-42. Precipitation events correlate well with pond gains, which does not support well comment that overland flow is 'negligible'

Figure B-42. The landfill pond measured gain/loss data does not appear to well support previous assumption that the landfill pond remains steady controlled mainly by evaporation. The pool elevation exhibits large swings What is the assumption that these large swings are associated with, other than evaporation If it was all associated with evaporation, one would think that data from other ponds in the proximity would demonstrate similar evaporation impacts

Section 3 1.3 Evaporation estimates are discussed, but no information as to the estimate provided. Check cross reference of 5.1 2 2 2 3/App. B per Fig 7-15.

Figure D-4, Overland Flow Boundaries. If the various colored cells represent overland flow boundaries, add note to the explanation

6

Figure E-29 Suggest addition of notes that variability seen in B3 is likely related to daily fill and discharge of water to B4, and that the variability for A4 and B5 is likely related to batch and release water management.

Typographical Errors

Section 1 2, 2nd paragraph, 2nd sentence – remove duplicate in 3rd sentence

Section B 1 2 Last sentence is hanging

Page B-23, 2nd sentence Change “purposed” to “purpose”
Page B-24, 3rd sentence Change “imperious” to “impervious”
Page B-27, 4th paragraph, 2nd sentence. Change “ dirt-lined and to grass-lined” to “ dirt lined and grass-lined ”

There are many more present in the document

List of Model Application

- Impact of C2 discharge on Woman Creek
- Impact of the SW027 Subdrainage to Woman Creek
- Evaluation of what A and B series pond configuration can be supported by predicted flows
- Evaluation of predicted flow capability to sustain suitable habitat for the Preble Mouse – North and South Walnut Creek

Flood-event scenarios for 10-yr, 50-yr, 100-yr events and what configuration of ponds could support such events post-closure – assuming no imported water and IA pervious surface areas with some subsurface features left in place e g , concrete walls, floors, foundations